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Broad Field

01 Natural and Physical Sciences

Australian Standard Classification of Education (ASCED)

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Broad Field 01 Natural and Physical Sciences

Natural and Physical Sciences is the study of all living organisms and inanimate natural objects, through experiment, observation and deduction.

The theoretical content of Broad Field 01 Natural and Physical Sciences includes:

- atmospheric sciences
- biological processes
- chemical reactions
- geological composition and structures
- laboratory methodology
- mathematical and statistical techniques
- observation and measurement
- scientific method
- subatomic particles and quantum mechanics
- thermodynamics and entropy

The main purpose of this broad field of education is to develop an understanding of the workings of the universe, and to extend the body of scientific knowledge.

This broad field comprises the following narrow fields:

Narrow Field

0101 Mathematical Sciences

Narrow Field 0101 Mathematical Sciences

Mathematical Sciences is the study of abstract deductive systems, numerical facts, data and their applications.

The main purpose of this narrow field of education is to develop an understanding of symbolic language and logic, mathematical theories and their deductive systems, techniques and modelling. It also involves developing an understanding of random processes and the ability to apply mathematical methods and modelling techniques to practical problems.

Courses in Narrow Field 0101 Mathematical Sciences develop skills in:

- application of mathematical methods to problem solving
- analysis and development of mathematical systems and theories
- systematic methods to prove theorems and to construct, analyse and interpret mathematical models and numerical data

This narrow field comprises the following detailed fields:

010101 Mathematics

010103 Statistics

010199 Mathematical Sciences, n.e.c.

010101 Mathematics

Mathematics is the study of deductive systems, including algebra, arithmetic, geometry, analysis and applied mathematics.

Examples of subjects in this detailed field include:

- calculus
- numerical analysis
- combinatorics
- optimisation
- topology
- trigonometry

010103 Statistics

Statistics is the study of collecting, describing, arranging and analysing numerical data.

Examples of subjects in this detailed field include:

- biometrics
- linear and multivariate models
- probability estimations
- statistical significance tests
- stochastic processes
- time series analysis

Exclusions:

Econometrics. This is included in Detailed Field 091903 Econometrics.

010199 Mathematical Sciences, n.e.c.

This detailed field includes all Mathematical Sciences not elsewhere classified.

Narrow Field

0103 Physics and Astronomy

Narrow Field 0103 Physics and Astronomy

Physics and Astronomy is the study of the laws governing the structure of the universe and the forms of matter and energy.

The main purpose of this narrow field of education is to develop an understanding of the fundamental properties of the universe and the laws which govern its behaviour and to assess and validate physical phenomena.

Courses in Narrow Field 0103 Physics and Astronomy develop skills in:

- analysing and interpreting data resulting from experiments to test theories and hypotheses
- application of appropriate laboratory techniques and procedures to research
- application of knowledge of physical laws to practical problems

This narrow field comprises the following detailed fields:

010301 Physics

010303 Astronomy

Exclusions:

Medical physics. This is included in Detailed Field 019901 Medical Science.

010301 Physics

Physics is the study of the laws governing states and properties of matter and energy.

Examples of subjects in this detailed field include:

- acoustics
- gravitation
- solid and liquid states
- geometric optics
- quantum mechanics
- thermodynamics

010303 Astronomy

Astronomy is the study of celestial bodies, their positions, motions, distances and physical conditions, and their origins and evolution.

Examples of subjects in this detailed field include:

- astrophysics
- celestial mechanics
- cosmology

Narrow Field

0105 Chemical Sciences

Narrow Field 0105 Chemical Sciences

Chemical Sciences is the study of the composition, structure, and the chemical transformations of matter.

The main purpose of this narrow field of education is to develop an understanding of the fundamental properties of elements, compounds and materials, and their reactions and transformations.

Courses in Narrow Field 0105 Chemical Sciences develop skills in:

- application of knowledge of the fundamental properties of elements, compounds and their reactions
- identifying the compositional and energy changes resulting from chemical reactions
- using modern chemical instrumentation for the structural analysis of chemicals

This narrow field comprises the following detailed fields:

- 010501 Organic Chemistry
- 010503 Inorganic Chemistry
- 010599 Chemical Sciences, n.e.c.

Exclusions:

Medical biochemistry. This is included in Detailed Field 019901 Medical Science.

010501 Organic Chemistry

Organic Chemistry is the study of the description, properties, reactions and preparations of carbon compounds.

Examples of subjects in this detailed field include:

- aromatic compounds
- carbon-carbon bond formation
- free radicals
- hydrocarbons
- isomerism
- organic synthesis

Exclusions:

Biochemistry. This is included in Detailed Field 010901 Biochemistry and Cell Biology.

010503 Inorganic Chemistry

Inorganic Chemistry is the study of the description, properties, reactions, and preparation of all the elements and their compounds, with the exception of carbon compounds.

Examples of subjects in this detailed field include:

- crystallography
- main group metal chemistry
- non-metal chemistry
- structural basis of inorganic solids

010599 Chemical Sciences, n.e.c.

This detailed field includes all Chemical Sciences not elsewhere classified.

Examples of subjects in this detailed field include:

- analytical chemistry
- colloid science
- environmental chemistry
- theoretical chemistry
- physical chemistry

Exclusions:

Geochemistry. This is included in Detailed Field 010707 Geochemistry.

Narrow Field

0107 Earth Sciences

Narrow Field 0107 Earth Sciences

Earth Sciences is the study of the nature, composition and structure of the Earth including its atmosphere and hydrosphere.

The main purpose of this narrow field of education is to develop an understanding of the physical properties of the Earth's crust and the characteristics of its soil, landforms, climate, hydrosphere and atmosphere.

Courses in Narrow Field 0107 Earth Sciences develop skills in:

- analysing the structure, composition and evolution of the Earth, including its atmosphere and hydrosphere
- identifying and classifying crystals, rocks and minerals
- using geological instruments and field techniques for geological purposes

This narrow field comprises the following detailed fields:

010701 Atmospheric Sciences

010703 Geology

010705 Geophysics

010707 Geochemistry

010709 Soil Science

010711 Hydrology

010713 Oceanography

010799 Earth Sciences, n.e.c.

010701 Atmospheric Sciences

Atmospheric Sciences is the study of the composition and structure of the earth's

atmosphere and climate.

Examples of subjects in this detailed field include:

- atmospheric stability, moisture and motion
- climatology
- meteorology

010703 Geology

Geology is the study of origin, composition and structure of the earth.

Examples of subjects in this detailed field include:

- coastal and marine geoscience
- sedimentology
- mineralogy
- petrology
- tectonics
- volcanology

Exclusions:

Palaeontology. This is included in Detailed Field 019999 Natural and Physical Sciences, n.e.c.

010705 Geophysics

Geophysics is the study of the physical properties of the Earth through collecting and interpreting gravitational, magnetic, seismic and electrical data.

Examples of subjects in this detailed field include:

- electrical properties of rocks and minerals
- geomagnetism
- petrophysics
- seismology

010707 Geochemistry

Geochemistry is the study of the quantities and distribution of the chemical elements in minerals, ores, rocks, soils, water, and the atmosphere.

Examples of subjects in this detailed field include:

- hydrogeochemistry
- sediment geochemistry

010709 Soil Science

Soil Science is the study of the origins, composition, structure and classification of soils.

Examples of subjects in this detailed field include:

- soil nutrient and water supply
- soils in the landscape
- the soil environment
- soil mineralogy

010711 Hydrology

Hydrology is the study of the location and movement of inland water, both frozen and liquid, above and below ground.

Examples of subjects in this detailed field include:

- flood estimation models and procedures
- groundwater modelling
- water catchments
- water resources

010713 Oceanography

Oceanography is the study of the origins, composition, structure and history of the oceans and the ocean floor.

Examples of subjects in this detailed field include:

- chemical and physical properties of seawater
- currents, waves and tides
- ocean floor topography

010799 Earth Sciences, n.e.c.

This detailed field includes all Earth Sciences not elsewhere classified.

Examples of subjects in this detailed field include:

- physical geography

Narrow Field

0109 Biological Sciences

Narrow Field 0109 Biological Sciences

Biological Sciences is the study of the structure, function, reproduction, growth, evolution and behaviour of living organisms.

The main purpose of this narrow field of education is to develop an understanding of the genetics and physiology of living organisms and of the relationship of living organisms to one another as well as the physical environment.

Courses in Narrow Field 0109 Biological Sciences develop skills in:

- analysing and interpreting biological data
- analysing the factors effecting the growth and reproduction of living organisms
- examining cells and tissue to determine their structure and function

This narrow field comprises the following detailed fields:

010901 Biochemistry and Cell Biology

010903 Botany

010905 Ecology and Evolution

010907 Marine Science

010909 Genetics

010911 Microbiology

010913 Human Biology

010915 Zoology

010999 Biological Sciences, n.e.c.

Exclusions:

Medical biology. This is included in Detailed Field 019901 Medical Science.

010901 Biochemistry and Cell Biology

Biochemistry and Cell Biology is the study of the chemistry of living organisms and the structure and function of cells.

Examples of subjects in this detailed field include:

- biosynthesis
- cellular regulation

- cytology
- molecular biology
- metabolism

Exclusions:

Medical biochemistry. This is included in Detailed Field 019901 Medical Science.

010903 Botany

Botany is the study of plants.

Examples of subjects in this detailed field include:

- plant anatomy
- plant histology
- plant morphology
- plant physiology
- plant taxonomy

Exclusions:

Palaeobotany. This is included in Detailed Field 019999 Natural and Physical Sciences, n.e.c.

Horticulture. This is included in Detailed Field 050301 Horticulture.

010905 Ecology and Evolution

Ecology and Evolution is the study of interactions between organisms and their environment, and the processes of biological change in organisms.

Examples of subjects in this detailed field include:

- autecology
- biodiversity
- ecosystems
- habitats
- organic population studies
- synecology

Exclusions:

Human and primate evolution. These are included in Detailed Field 010913 Human Biology.

010907 Marine Science

Marine Science is the study of marine and estuarine plants and wildlife. It includes freshwater science.

Examples of subjects in this detailed field include:

- marine, estuarine and freshwater biology
- marine, estuarine and freshwater ecology

010909 Genetics

Genetics is the study of heredity and the units of biological inheritance.

Examples of subjects in this detailed field include:

- cytogenetics
- genotypes
- microbial genetics
- gene expression
- molecular genetics
- monohybrids
- phenotypes

Exclusions:

Recombinant DNA technology. This is included in Detailed Field 019905 Food Science and Biotechnology.

010911 Microbiology

Microbiology is the study of microscopic forms of life such as bacteria, viruses and protozoa.

Examples of subjects in this detailed field include:

- microbial ecology
- microbial physiology
- microbial taxonomy
- virology

Exclusions:

Medical microbiology. This is included in Detailed Field 019901 Medical Science.

010913 Human Biology

Human Biology is the study of human and primate anatomy, physiology, evolution and biosocial interactions.

Examples of subjects in this detailed field include:

- biological anthropology
- human histology
- human evolution and variation
- human growth, development and reproduction
- primatology

010915 Zoology

Zoology is the study of animals and insects.

Examples of subjects in this detailed field include:

- animal anatomy
- animal behaviour
- animal embryology
- animal physiology
- animal taxonomy
- entomology

010999 Biological Sciences, n.e.c.

This detailed field includes all Biological Sciences not elsewhere classified.

Examples of subjects in this detailed field include:

- biogeography
- bioinformatics
- biophysics
- mycology
- neuroscience
- parasitology

Narrow Field

0199 Other Natural and Physical Sciences

Narrow Field 0199 Other Natural and Physical Sciences

This narrow field includes all Natural and Physical Sciences not elsewhere classified.

This narrow field comprises the following detailed fields:

- 019901 Medical Science
- 019903 Forensic Science
- 019905 Food Science and Biotechnology
- 019907 Pharmacology
- 019909 Laboratory Technology
- 019999 Natural and Physical Sciences, n.e.c.

019901 Medical Science

Medical Science is the study of the application of physics, biology and chemistry to medicine.

Examples of subjects in this detailed field include:

- biomedical science
- clinical and medical biochemistry
- medical biotechnology
- clinical and medical microbiology
- medical physics

Exclusions:

Biomedical engineering. This is included in Detailed Field 039903 Biomedical Engineering.

Pathology and histopathology. These are included in Detailed Field 060113 Pathology.

Radiology. This is included in Detailed Field 060115 Radiology.

019903 Forensic Science

Forensic Science is the study of the application of scientific techniques to criminal investigations.

Examples of subjects in this detailed field include:

- ballistics
- blood splash pattern analysis
- crime scene investigation
- fingerprint enhancement and identification

- trace evidence
- fire and explosion investigation

019905 Food Science and Biotechnology

Food Science and Biotechnology is the study of the physical and chemical properties of food, and the industrial use of living organisms to produce food, pharmaceuticals and other products.

Examples of subjects in this detailed field include:

- fermentation
- food analogues
- food preservation: heating, chilling, freezing, dehydration, salt, sugar, acids, and chemical preservatives
- oenology
- protein technology
- recombinant DNA technology

Exclusions:

Food microbiology. This is included in Detailed Field 010911 Microbiology.

019907 Pharmacology

Pharmacology is the study of the development, uses and effects of drugs.

Examples of subjects in this detailed field include:

- clinical drug trials
- drug analysis
- pharmacodynamics
- pharmacokinetics
- toxicology

019909 Laboratory Technology

Laboratory Technology is the study of the procedures, techniques and equipment used in biological, chemical, medical and other laboratories.

Examples of subjects in this detailed field include:

- chromatography
- laboratory safety

- microscopy
- spectroscopy
- sample preparation and handling

Exclusions:

Radiology. This is included in Detailed Field 060115 Radiology.

019999 Natural and Physical Sciences, n.e.c.

This detailed field includes all Natural and Physical Sciences not elsewhere classified.

Examples of subjects in this detailed field include:

- palaeobotany
- palaeontology